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Theater Missile Defense: Issues for the 104th Congress

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Abstract: In this brief, Steven A. Hildreth addresses issues facing the 104th Congress as theater missile defense (TMD) becomes an increasingly important national defense priority. Major concerns include the relative importance of TMD systems as one element of the USÕs efforts to deal with proliferation, the role of TMD in overall global missile defense, the affordability of Pentagon-proposed plans for TMD in the 1990s, and the salience of the ABM Treaty as advanced TMD development proceeds.

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Theater Missile Defense: Issues for the 104th Congress

SUMMARY

Theater missile defense (TMD) remains an important national defense priority. Concern over the global spread of ballistic missiles and the 1991 war against Iraq focused attention on the need for fielding effective TMD systems in the near-term.

Since the early 1980s, Congress has urged the executive branch to develop effective TMD systems. Only after Desert Storm, however, did the military services and the Strategic Defense Initiative Organization (SDIO), now called the Ballistic Missile Defense Organization (BMDO), begin to give TMD development the funding and programmatic attention felt necessary by Congress.

Today, each of the services plans to deploy missile interceptor systems. Some Members of Congress question the need to develop advanced wide-area TMD systems, which, to many, would appear to be more beneficial to U.S. allies and friends than to U.S. and coalition forces overseas. In addition, concerns over U.S. arms control obligations are raised.

Some major TMD programs have projected major cost increases and experienced program delays. This Congress sought to accelerate various TMD programs and address program deficiencies.

Problems with U.S. arms control commitments also remain. The 1972 ABM Treaty does not define the difference between strategic or theater ballistic missiles. Hence, permitted TMD testing and deployment has been the subject of U.S.-Russian negotiations for several years. Currently, the Administration apparently has agreed to set formal parameters between permitted TMD testing and deployment and limited ABM testing and deployment. A number of unresolved substantive questions and concerns remain. Many in Congress are at odds with the direction of these proposed changes.

Congress continues to face other important issues. What should be the relative importance of TMD systems as one element of the Nation's efforts to deal with global proliferation? Are the Pentagon-proposed plans for TMD for the 1990s affordable? Should the United States do more and deploy advanced TMD systems more quickly? How should technical failures among advanced TMD programs be dealt with in setting TMD priorities? Are there areas in the TMD budget in which significant budgetary savings are possible? Should the United States modify the ABM Treaty to permit advanced TMD?

Finally, questions about the Israeli Arrow program remain. Although the Pentagon reportedly had no plans to support this program once the development contract has expired, Israel sought and received continued U.S. funding.

MOST RECENT DEVELOPMENTS

A conference agreement on the FY1997 defense authorization bill (H.R. 3230) was announced on July 30. It was approved in the House on August 1 and in the Senate on September 10. The bill would provide $621.8 million for the Theater High Altitude Area Defense program, or THAAD (the Administration requested $481.8 million), $310.7 million for the Navy Lower-Tier program (the same as requested), $304.2 million for Navy Upper-Tier programs (the request was for $58.2 million), $56.2 million for Corps SAM (as requested), and $96.9 million for the Patriot PAC-3 (as requested). In addition to the funding increase for THAAD, the bill further questions the Pentagon's plan for an emergency THAAD capability by doubling the number of interceptor missiles for that plan from 40 to 80. Congress also took issue with the Administration's proposed delay in fielding a Navy upper-tier system, and therefore provided funding support and policy guidance in accelerating this program.

Recent TMD tests have important implications for the TMD program. In late August, Israel reportedly conducted a successful intercept of the Arrow 2 missile. It was the first such success after many failures. Earlier, on July 15, the sixth THAAD test failed to intercept its target; it has yet to intercept any target.

BACKGROUND AND ANALYSIS

Background

Theater missile defense (TMD) is widely viewed as an important national security priority. This is especially so as policymakers, military planners, and others consider how to respond to the threats posed by global ballistic missile proliferation armed with mass destruction weapons. But TMD's importance has not always been so clear. Before the 1991 war against Iraq, the proliferation of ballistic missiles and weapons of mass destruction seemed to most observers a serious, yet manageable, problem. Iraq's missile attacks against Israel, Saudi Arabia, and U.S. forces in Saudi Arabia during the war proved that missile proliferation could present direct risks to U.S. forces and strategic interests. National leaders became increasingly interested in developing and deploying effective missile defenses as a key element of a broader, growing commitment to counter the spread of weapons of mass destruction and their means of delivery.

The relatively modest attention that was paid to TMD issues during the 1980s resulted primarily from congressional pressure to develop defenses against potential Soviet short-range missile attacks in Europe. During this period, the public record reflects Congress's frustration with what it considered to be the unresponsiveness of the Pentagon to the tactical missile threat (see CRS Report 91-456 F, *The Patriot Air Defense System and the Search for an Antitactical Ballistic Missile Defense*). Only after the war against Iraq did the Department of Defense and the executive branch emphasize TMD on a par with that prescribed by Congress.

The current TMD effort raises many questions for Congress. What role should TMD play among the variety of U.S. efforts to respond to global ballistic missile proliferation? Is the Pentagon's TMD plan affordable? Might TMD threaten the 1972

Anti-Ballistic Missile (ABM) Treaty? Should the United States continue to support the Israeli Arrow TMD program? Should TMD systems be sold or given to U.S. allies and friends? How involved should U.S. friends and allies be in developing and deploying TMD systems? And, how should TMD systems be integrated with U.S. general purpose forces? Congress' decisions on these issues may have important implications for U.S. military strategy, defense funding requirements, nonproliferation efforts, and relations with its friends and allies.

What is Theater Missile Defense?

Theater missile defenses are weapon systems designed to attack and destroy theater missiles, warheads, and systems, or mitigate the consequences of a theater missile attack. Theater missiles include ballistic missiles, cruise missiles, or air-to-surface guided missiles whose launch point and target lie within a theater (or region). The Patriot system used in the 1991 war against Iraq illustrates a basic TMD system. It is composed of missile interceptors, sensors, and command, control and communications elements. TMD does not include defenses directed against long-range missiles capable of intercontinental flight (this is referred to as strategic ballistic missile defense or anti-ballistic missile defense). These threats come from several sources, including some Third World countries who acquired short-range missiles from the Soviet Union and others; some Third World countries produce such missiles indigenously or have programs underway to develop them.

Some consensus has emerged over the past few years that global ballistic missile proliferation threatens U.S. national security interests overseas and challenges U.S. defense planning. U.S. policymakers favor a range of military options, with stand-alone TMD systems viewed by most as a key element in any U.S. strategy. In addition, most decisionmakers favor additional arms and technology controls, as well as a range of counterproliferation initiatives, to prevent or slow the spread of these types of missiles as well as weapons of mass destruction.

Congressional Interest in TMD

Since the early 1980s, Congress has expressed strong support for developing and fielding effective TMD systems to defend U.S. and allied military forces against tactical cruise and ballistic missiles. Congress pursued this agenda in three ways: first, it actively spurred the Defense Department toward deploying a near-term antitactical ballistic missile system, pushing for development, and later deployment, of the Army's Patriot PAC-2 system; second, Congress pushed the SDI program to develop longer-term and more effective TMD technologies; and third, it earmarked TMD funds specifically in SDI budgets to ensure their full funding and support, even while constraining overall budgets for SDI.

The Desert Storm experience reinforced and focused Congress' commitment to TMD. As a result, Congress passed the 1991 Missile Defense Act (P.L. 102-190), which, among other things, called for a national commitment to develop and deploy effective TMD systems at the earliest practicable date. Although Congress today asks critical questions of the Pentagon's TMD effort, Congress, in FY1995, approved 98% of the Pentagon's request for TMD funding and sought to ensure that effective TMD programs would not be constrained by treaty.

Development of TMD Policy. Partly in response to congressional directives, the Army in the early 1980s identified specific military requirements for a theater missile defense. As a consequence, it expanded the capability of the existing Patriot air-defense system to include self-defense against Soviet tactical ballistic missiles. Later, the SDI Organization was formed to address "the threat posed by strategic missiles" to the United States and to U.S. friends and allies overseas. In 1985, President Reagan directed SDIO to "develop cost-effective approaches for defending the United States and our allies against nuclear and conventionally armed ballistic missiles of all ranges." Further DOD guidance then focused SDIO's TMD effort toward assisting the NATO air defense effort against the possibility of a Soviet missile attack against NATO forces in Europe. This effort was nominal, however, and the Pentagon gave scant attention to dealing with potential Third World missile proliferation.

The demise of the Soviet Union, the end of the Cold War, and the war against Iraq brought a new focus to the SDI and TMD programs. Since 1991, the TMD program has been expanded to emphasize the transition from research and development to acquisition of TMD systems. TMD budgets have increased significantly. If accepted, BMDO's near-term TMD architecture (or system concept) would consist largely of upgraded, existing land-based air-defense interceptors, and land- and sea-based radars, sensors, and communications systems. The objective would be to extend the military's current air-defense capabilities to include limited defenses against theater missile attacks. BMDO's planned long-term (post-1998) architecture includes more effective, dedicated TMD systems based on land and sea.

TMD Mission. As part of the Defense Department's normal acquisition process, every major weapon system must be justified by a Mission Needs Statement (MNS) approved by the Joint Chiefs of Staff (JCS). Such a statement was approved in early 1992 to guide the services' TMD efforts. It states that TMD is needed to 1) prevent the launch of theater missiles against U.S. forces, allies, and areas of interest; 2) protect U.S. forces, allies, and areas of interest against theater missile attacks; 3) reduce the probability of, and minimize the effects of, damage caused by a theater missile attack; and 4) detect and target theater missile platforms, to detect, warn of, and report theater missile launches, and coordinate a multifaceted response to a theater missile attack and integrate it with other military combat operations.

In September 1993, the Pentagon completed its Bottom Up Review of U.S. defense strategy, doctrine, and force structure. In that review, the Pentagon gave TMD priority over National Missile Defense (NMD) programs; $12 billion was planned for the FY1995-1999 TMD program.

TMD Organization

This section provides basic information on how the Pentagon is now organized to develop, deploy, and utilize theater missile defenses.

BMDO Role. The BMD Organization has three TMD roles. First, BMDO retains central responsibility to develop advanced TMD systems. Second, in coordination with each of the military service and acquisition heads, BMDO is responsible for identifying the funding required for developing those TMD systems. Finally, BMDO has the day-to-day responsibility for administering and managing all TMD programs. When Congress directed the Defense Department to create a new TMDI office, it gave the

Secretary of Defense discretionary authority over how it should be done. In December 1992, Secretary Cheney decided to place the new TMDI Office within SDIO. When the Clinton Administration entered office, concerns over whether SDIO, then later BMDO, should manage the Pentagon's TMD effort began to wane.

Service Roles. The military service roles and missions, which have been agreed to formally, are broadly outlined in the SDIO Theater Missile Defense Report to Congress, dated March 1991. The services are to:

1) Help establish operational requirements for TMD systems;
2) Manage TMD programs under BMDO's direction;
3) Support plans for testing and evaluating TMD programs, as well as producing, deploying, and operating proposed TMD systems; and
4) Plan for and fund TMD systems after their transfer from BMDO to the military service, including costs for TMD operations, support, and force structure.

In addition, each service has agreed to undertake more specific responsibilities and coordinate its efforts with the other services:

1) The Army is designated to be the combat and material developer for all ground-based and any Army space-based and airborne TMD systems;
2) The Navy is designated to be the combat and material developer for any sea-based TMD components;
3) The Marine Corps is tasked to identify and define requirements for TMD self-defense for forward deployed and expeditionary military forces; and
4) The Air Force is designated to be the combat and material developer for all space-based, airborne, and some ground-based TMD system support components.

The Roles of Other Organizations. Several other defense organizations are also given TMD-related responsibilities. These include the Defense Intelligence Agency, which identifies specific threats that U.S. TMD systems would be required to face in future scenarios; the Defense Communications Agency, which develops TMD telecommunications requirements; the Theater/Specified Commanders-in-Chief (CINCs), who identify TMD requirements for their regions of responsibility; and the Chairman of the JCS, who, in conjunction with the CINCs, will coordinate and validate TMD mission needs and operational requirements, and establish command and operational control doctrines, command relationships, force structures, and rules of engagement for wartime use of TMD systems.

Status of TMD Programs

This section briefly reviews the current status of selected TMD programs, emphasizing the active missile defense programs. (For a more detailed program review, see CRS Report 93-585 F, *Theater Missile Defense Policy, Missions, and Programs: Current Status,* June 11, 1993.)

Active Defense Programs. TMD interceptor programs are designed to provide effective defenses against a theater missile once it has been launched. This includes the requirement for capabilities to destroy missiles at every point along their flight trajectory, from immediately after launch to shortly before impact. Active defenses could consist of ground-, air-, sea-, and space-based TMD interceptors. Each of the

military services is pursuing comparable near- and long-term TMD interceptor programs.

The Army and Navy are developing several programs to give them some near-term TMD capability if required in the next few years. The Army is upgrading the current version of the Patriot missile system called the PAC-3 (the PAC-2 version was used in Desert Storm). The ERINT (Extended Range Interceptor) hit-to-kill missile, built by Loral, was selected to be the PAC-3 missile in April 1994. According to the Pentagon, the total Patriot PAC-3 upgrade program will cost about $4.3 billion. Reportedly, about 1,400 ERINT missiles would be procured. The Army is also developing a new wide-area interceptor, THAAD (Theater High Altitude Area Defense), for possible prototype deployment in the mid-1990s (described more fully below). The Army also expects to continue upgrading the Hawk air-defense system to provide a limited, mobile capability against very short-range ballistic missiles.

The Navy is upgrading its Aegis-based SM-2 Block IV A air-defense missile (and associated sensors and computers) to give it a limited missile defense capability against cruise and short-range ballistic missiles. Some program status highlights include the Defense Acquisition Board's approval of the program in August 1994; the Initial Operational Test and Evaluation in October 1994; and a low-rate of initial production in 1995.

Most TMD budget support, however, is given to developing more advanced TMD systems that would seek to provide increased effectiveness and a greater area of defended coverage. These defenses might extend from a few dozen to perhaps several hundreds of miles. In contrast, the defensive range of the Patriot used in Desert Storm was about a dozen miles or less.

Two major TMD programs are being pursued to develop a wide-area defense against theater missile attacks. The first is the THAAD program, which developed out of the U.S. Army's Space and Strategic Defense Command study of the requirements and technologies for high altitude missile defenses. THAAD interceptors would seek to destroy incoming missiles or warheads shortly after they reenter the earth's atmosphere and, if necessary, later again in the flight trajectory. This system would be transportable (i.e., it could be carried on large cargo planes to its deployment site and would be "mobile" within that theater). THAAD's objective thus would be to destroy the attacking missile or warhead far away from its intended target.

Some of THAAD's milestones include the following. The THAAD development contractor (Lockheed, now Lockheed Martin) was chosen in late 1992. THAAD is now in the Demonstration/Validation phase, which is scheduled for completion sometime in 1996. By FY1997, under the mandate of the Missile Defense Act, a deployable prototype THAAD battery (called a User Operational Evaluation System, or UOES) was planned to be available to Army troops. (In fact, the first U.S. Army THAAD battery was activated at Ft. Bliss, TX, in June 1995; after training, they will assume increasing responsibilities and eventually take over the system for the final series of Demonstration/Validation tests.) Although the basic UOES concept and schedule remains unchanged after the February Missile Defense Review, it is not expected that the systems will be available until 1999. This UOES battery will consist of four launchers, possibly 40 missile interceptors, two radars, and battle management, communications, and support equipment. The idea is that it could be deployed during a crisis for

possible use. THAAD First Unit Equipped (FUE) units, scheduled earlier for 2000, may now be available between 2004 and 2006, depending on funding levels.

After many delays, the first THAAD missile test took place on April 21, 1995. Reportedly, its mission objectives, which generally were to simply fly the missile and not attempt an intercept, were achieved. The second test flight occurred on July 31, 1995. Reports indicate it achieved most of its flight test objectives, but problems developed when the kill vehicle velocity was determined to exceed flight range parameters. The third test, on October 13, 1995, reportedly met its objectives to acquire and track a target ballistic missile, evaluate the command, control, communications, and intelligence hardware and software, and for the kill vehicle to respond to in-flight target updates. On December 13, 1995, the fourth test developed problems after the kill vehicle separated from the booster. Reportedly, an error in the first in-flight target update caused the kill vehicle to make a large divert; subsequent corrections were made, but the final divert to the target was not possible because the on-board fuel had been used up. On March 22, 1996, THAAD attempted to intercept a target missile. Reportedly, this objective was not met because of problems with the in-flight command functions. The July 15 intercept attempt was also unsuccessful.

The second major active wide-area defense program is the Navy's Theater Wide Program (formerly the Navy upper-tier system). The Administration has recommended increasing this effort by about $600 million over the FYDP, or about $130 million per year. Many observers expect Congress to increase this further, to perhaps $200 million per year, in order to meet an IOC of 2001. The current favored option is to proceed to a system-level intercept flight with LEAP (a lightweight space interceptor) and the Navy's air-defense Standard Missile (SM-2) aboard the Navy's Aegis ships. Supporters of the Navy Theater Wide Program hope that it might provide the United States the capability to intercept attacking missiles in space, thus providing a relatively large regional defense against theater-range ballistic missiles.

Two successful tests of the LEAP kill-vehicle itself have been reported. Two recent intercept tests, however, involving the launching of a LEAP-equipped Standard missile from an Aegis cruiser against a target missile launched from the Wallops Flight Facility in Virginia, were only partly successful -- they did not intercept the target. According to the Pentagon, a Navy SM-2/Leap UOES might be available in 1997, with fully operational capabilities by the turn of the century.

Other programs under consideration will examine the possibility of destroying attacking missiles shortly after they are launched. This is called boost-phase intercept (BPI). The Air Force will look at a near-term concept to modify existing air-to-air missiles on fighter planes to attack theater missiles before they leave the atmosphere, preferably over enemy territory. A longer-term Air Force airborne laser concept is also under consideration. The United States also is negotiating with the Israelis over a long-term concept to develop unmanned aerial vehicles that would fly over enemy missile launch areas and then intercept missiles during the first phase of their flight. None of these programs, however, is scheduled for demonstration and validation studies.

Finally, another active defense program under development would provide for a smaller area of defended coverage. The Army has been considering a TMD system, called Corps SAM (Surface to Air Missile), for possible Marine Corps use. It would

replace the Hawk air-defense system. Corps SAM would be designed as a mobile point-defense system for expeditionary forces.

In September 1994, the Pentagon announced that the United States had reached preliminary agreement with Germany and France to codevelop and acquire a $15 billion corps-level TMD system on a cost-sharing basis, calling the program the Medium Extended Air Defense System (MEADS). MEADS would be a highly mobile system designed to provide 360 degree defense against tactical ballistic missiles, cruise missiles, and other air threats. The endeavor would build on the three nations' comparable programs: U.S. (Corps SAM); France (SAMP-T, with Italian cooperation); and Germany (TLVS). The three countries, joined by Italy, signed a formal Statement of Intent on February 3, 1995. France later dropped out of the program. According to BMDO, Corps SAM/MEADS could achieve an initial operational capability in 2005. The February Pentagon Review adds about $85 million to fund this venture through the Definition/Validation phase. According to BMDO, the research and development costs of MEADS is about $2 billion.

C^3I (Command, Control, Communications, and Intelligence). The principal budget support for TMD C^3I goes for upgrading existing sensors and developing a new TMD radar. In the near-term, the Navy is modifying its SPY-1 air-defense radar, as well as various battle management and control capabilities aboard Aegis ships to permit a near-term TMD capability using an upgraded Aegis air-defense missile (SM-2 Block IV A). Additional upgrades to the SPY-1 radar are planned for use with the Navy's eventual long-term interceptor choice. The Marines are upgrading their TPS-59 radar in conjunction with a modified Hawk missile to give them a limited, near-term TMD capability. The Air Force is reportedly improving some of its satellite reconnaissance assets to assist in a range of TMD operations.

The U.S. Army is developing a much more capable mobile radar system called the TMD-GBR (Ground-Based Radar). It is scheduled for production after the year 2000 and will be the mainstay for ground-based TMD systems. If deployed, the TMD-GBR system would provide the necessary fire control for the planned THAAD system and kill assessment and target cuing to Patriot PAC-3. Two deployable radars were available for operational assessments in 1995, during the normal demonstration and validation phase of this program's development.

Israeli Arrow Program (ACES). The ACES (Arrow Continuation Evaluation Study) is an ongoing, joint U.S. (BMDO)-Israeli program to develop and deploy an area-wide TMD system for use by Israel beginning in the late 1990s. Arrow would be used against missiles with ranges reportedly up to about 1,000 kilometers. The Arrow would use an explosive warhead, in contrast to THAAD's hit-to-kill design (i.e., a direct interception at high speed). The United States has agreed to pay for 78% of the program's development cost, while Israel will pay for the balance of the estimated $350 million, 4-year effort. The final cost of the Israeli TMD system, consisting of perhaps hundreds of Arrow interceptors and many radars, other sensors, and fire control systems is not publicly available. Some experts here and abroad, however, predict the system may cost $1.2 billion to $10 billion. The United States has said it will not support this program beyond some stage in the research and development cycle. Although it appears that Israel is likely to proceed, the Israeli government has not yet made a public commitment to do so. Indications are that Israel plans to deploy experimental elements of the system in the winter of 1997.

In March 1993, the first successful launch and demonstration of Arrow's interception accuracy was reported. The June 1994 Arrow test successfully intercepted a target missile for the first time. For several years, the Pentagon indicated that it did not plan to acquire the Arrow for its own use or to fund the program beyond the development stage. In May 1995, however, the Pentagon reportedly agreed to a 5-year $200 million funding package for the Arrow program and other Israeli missile defense programs. In January 1996, Defense Secretary Perry confirmed this by announcing that the United States and Israel had agreed on a third phase of the Arrow program called the Arrow Deployability Project (ADP). Signed in April 1996, the United States pledged $200 million to match Israeli funding of $300 million over a five-year period. Additional cooperation was pledged on codevelopment of the U.S. Nautilus laser for short-range defensive purposes. Reportedly, U.S. funds would not be used toward deployment of Arrow, but rather to reduce program risk and to support technical studies.

ACES is a follow-on to the original 3-year Arrow program (1988-1991), which many considered disappointing; one of the planned primary objectives, an actual missile interception, never occurred due to serious technical problems with the missile's design and construction. These problems were apparently fixed after extensive U.S. technical assistance; an Arrow test launch occurred in late 1992. In February 1996, the second flight test of Arrow 2 was considered a success; no intercept was planned. In late August, Israel reported that the Arrow 2 successfully intercepted another missile target.

Concerns over system affordability and technology security have been raised by some in Congress and elsewhere. In an August 1993 report to Congress, the General Accounting Office concluded that "the Arrow/Aces program has schedule and technical risk, and Israel's cost estimate for a complete Arrow missile defense system may be understated." In an April 1994 report to Congress, BMDO pointed out that there are technical benefits of the program to the United States. But in dealing with questions raised over potential alternatives, the unclassified report only briefly described THAAD, PAC-3, and Navy TMD systems and that "these sensitive technologies could prevent the DOD from easily providing these systems to any other country." The report stated that the classified report provides the Pentagon's assessment of the Arrow system and a comparison to the candidate U.S. alternatives' system performance, schedule, and cost.

Analysis

What Role Should TMD Play?

Missile Proliferation and U.S. Foreign Policy. There is broad political support for TMD to protect U.S. and coalition forces deployed overseas. In fact, there is little opposition to developing and deploying effective TMD in a world where many nations are acquiring missiles and weapons of mass destruction. Such widespread support occurs mainly because most policymakers believe the United States will continue to play an activist role in the post-Cold War era. There are many potential regional conflicts and scenarios in which the United States might become engaged and in which regional missile proliferation is of grave concern. The reasoning goes that if U.S. involvement means putting U.S. interests or military forces at risk of missile attack, then defense planners must have military (i.e., TMD) options to deal with such risks.

Not as well understood are the foreign policy and defense planning implications of a region marked by proliferation (i.e., missiles and weapons of mass destruction), instability (i.e., security, political, economic, ethnic, religious), and widespread deployments of theater missile defenses. Therefore, some might argue that while there appear to be compelling reasons to support the deployment of TMD systems as a response to proliferation, policymakers and analysts may want to probe more deeply into the potential consequences of such decisions.

Arms Control and TMD. Most observers believe that the variety of arms control measures available to the United States, including the ABM Treaty, are complementary to U.S. TMD efforts. These other measures include strengthening existing national and international technology and export-control regimes; supporting and promoting regional confidence-building measures; encouraging international commitments to existing arms control regimes; and advocating new measures. The expectation is that through national and international commitments to nonproliferation, the proliferation of missiles and weapons of mass destruction will at a minimum be slowed and in some cases actually reversed. Other observers express doubt that arms control efforts can prevent further proliferation of missiles and weapons of mass destruction. They are thus convinced that effective TMD efforts are critical to U.S. national security objectives.

Is TMD Affordable?

TMD Development Costs and Redundancy. TMD budget plans experienced dramatic projected increases and changes over the past few years. The dramatic increases in TMD spending are due largely to widespread bipartisan political support for TMD, as well as new military service interest in carving out TMD roles and missions in the post-Cold War era. In January 1993, the Bush Administration projected TMD spending for FY1994 - FY1999 at slightly more than $20 billion. Under the Bottom Up Review, Defense Secretary Aspin reduced overall BMD budget plans and gave TMD top priority. The FY1994 TMD budget request doubled the FY1993 TMD budget. The FY1995 TMD budget request was about $2 billion; the FY1996 request is about $2.4 billion. Pentagon plans for TMD from fiscal years 1995 through 2002 is $14.6 billion. Increasingly, there are concerns raised over the future acquisition costs of funding a large number of TMD programs to their deployment.

However, the prospect of spending $2 billion or more per year on TMD alone through this decade received close congressional attention in 1994. Congress looked at issues such as program concurrency, as well as BMDO decisions to pursue parallel demonstration and validation programs for comparable TMD concepts and missions. For example, while the different service rationales for possessing independent wide-area TMD capabilities (e.g., the Army's THAAD, the Navy's marinized THAAD or SM-2 Block IV/LEAP, and the Israeli ACES) seemed by many to be persuasive, the budgetary implications of pursuing them was viewed as adverse. Hard choices for budget and policy planners are likely to lie ahead next year as well.

TMD Deployment Costs. When included in a GPALS architecture, TMD acquisition costs were estimated at about $14 billion. About $1 to $2 billion of the estimated $17 billion projected for TMD spending through this decade is planned for production of some TMD components. Because the Bush Administration did not consider TMD systems separate from an overall GPALS, the true costs of deploying

stand-alone TMD systems through this decade and beyond were not then known. The total life-cycle costs of widespread TMD systems under development has not been determined because so many variables and uncertainties remain. Congress is likely to continue to ask such questions in the FY1997 defense budget cycle. Congress is also likely to examine at an early date the additional force structure requirements and implications of TMD systems on the services as part of its effort to understand better the total costs of deploying TMD systems and determining their overall affordability.

Does TMD Threaten the ABM Treaty?

The 1972 ABM Treaty (and its 1974 Protocol) does not restrict TMD. Instead, the Treaty restricts testing and deployment of defensive systems capable of intercepting strategic ballistic missiles, which the Treaty does not clearly define. The Treaty permits up to 100 ground-based interceptor missiles and associated ground radars at one site for strategic BMD purposes. The United States specified its permitted site near Grand Forks, North Dakota, and briefly deployed a strategic missile defense system there from 1974-1975. The Treaty bans all testing and deployment of mobile ground, air, sea, and space-based missile defenses against strategic ballistic missiles.

Nonetheless, there are significant treaty concerns over the prospect of advanced TMD testing and deployment, partly because the ABM Treaty does not define a "strategic ballistic missile." Generally, a strategic missile is presumed to possess a range capability greater than 5,500 kilometers, or intercontinental range. Today, the longest-range theater ballistic missiles are generally considered to be Chinese CSS-2s, which travel about 3,000 kilometers.

For a while, the proposal generated intense opposition from some in the arms control community and in Congress who felt that such changes would eviscerate the ABM Treaty and render it meaningless. Many have taken strong positions to the effect that any changes to the ABM Treaty would have to be considered and approved by the Senate as part of its constitutional treaty-making prerogatives.

After a lengthy internal arms control compliance review of TMD programs, the Clinton Administration decided in late 1993 to establish a threshold, or demarcation, between theater and strategic ballistic missiles. The demarcation is defined in terms of a ballistic missile's peak velocity during its flight trajectory. In December 1993, the United States proposed to Russia and other interested former Soviet states that a demarcation of 5 kilometers per second be established to distinguish theater from strategic ballistic missiles. The demarcation corresponds to roughly a 3,200 kilometer-range ballistic missile. Negotiations with Russia, Ukraine, Kazakhstan, and Belarus have been underway since then under the auspice of the Standing Consultative Commission (SCC). (See CRS Report 94-374 F, *ABM Treaty Demarcation and Theater Missile Defense: Potential Implications.*) More recently, some in Congress have called on the Administration to postpone negotiations until Congress has had time to consider the proposed changes.

Because there is a theoretical potential for advanced TMD systems to intercept some strategic ballistic missiles, the Russians sought additional technical and other constraints as part of the proposed demarcation, including a 3 kilometer per second limit on the velocity of the interceptor. To this, there was intense opposition in the U.S. Government, particularly in the Pentagon. Although THAAD could be deployed under

such an agreement (i.e., its fly-out velocity is about 2.7 kilometers per second), the Pentagon wanted to preserve its options for future advanced TMD systems, such as the Navy upper-tier (whose fly-out velocity could exceed 4.5 km/sec) and the Air Force boost-phase intercept (whose fly-out velocity could exceed 5.5 km/sec).

After the September 1994 Clinton-Yeltsin Summit, the parties agreed to expedite resolution of outstanding issues on TMD demarcation. But differences over whether to propose limits on sea and air-launched TMD systems have stalled the negotiations. Resolution of outstanding issues has become further complicated with the new political changes in Congress because a number of House and Senate Republican leaders have asked the Administration to await congressional review of the implications of the proposed demarcation. Reportedly, the Administration is seeking to expedite the negotiations and has agreed that initial testing of the THAAD missile is permitted under the ABM Treaty. The Senate Foreign Relations Committee held hearings on these issues in spring 1995.

At the May 1995 Moscow Summit, Presidents Clinton and Gorbachev issued a joint statement on missile proliferation and missile defenses. Each side restated its commitment to the 1972 Anti-ballistic Missile (ABM) Treaty. Each also asserted that it must have the option to establish and deploy effective theater missile defenses, and such defenses (TMD) "must not lead to violation or circumvention of the ABM Treaty." Both also agreed that TMD systems will not be deployed by the sides against each other.

But U.S.-Russian negotiations over permitted TMD activities continued to stall until November 17, 1995. At that time, an Agreed Framework on theater missile defenses was reached in London; the details are being worked within the Standing Consultive Commission in Geneva. According to the Administration and the Pentagon, the Framework Agreement would allow the United States to proceed with even its most advanced TMD programs. But there is some debate as to whether the Navy Upper-Tier program would be permitted. According to news reports in the *Washington Times*, unnamed defense officials argue that the agreement would not permit such a system.

Adding further uncertainty to this complex issue are strong signals that the Russian parliament or Duma, as well as other Russian administration officials, have tied approval of START II (as well as further deep reductions) to Russian-American agreement on outstanding ABM Treaty issues.

Should the United States Pursue Arrow?

What Are the Potential Benefits? Although the United States does not have any plans to deploy the Arrow for its own use, the Pentagon cites several technical reasons for supporting it. These technical reasons have changed over the past several years. Currently, the first reason is that Arrow research gives strategic defense planners another data point to understand the challenges of, and prospects for, TMD. Critics would charge that such benefits are marginal, given the proliferation of U.S. TMD programs. The second benefit cited is that Arrow helps the United States better understand the concept of a focused warhead designed for destroying chemical and biological warheads. Most observers agree that there are few good technical analyses as to how to render such weapons ineffective, but are unsure whether the Israeli approach will prove effective.

What Are the Potential Costs? During the current development phase, the United States will pay 72% of an estimated $350 million program over about 4 years. Few observers would argue that by itself this is unaffordable. The total program costs are estimated at $1.2 billion to $10 billion, and some observers have begun to question whether the United States could or should subsidize this effort. Others, including some prominent Israeli military leaders, do not believe Israel could afford such a system by itself, an option it apparently could pursue absent U.S. budgetary support. This leads to an obvious question: Will the United States consider fully or partially subsidizing deployment of the Arrow, which is also likely to stand in funding competition with comparable U.S. systems? A Pentagon report to Congress, "Arrow System Report to Congress," detailed cost-effective alternatives to the proposed Arrow system. In December 1994, it was reported that Israel may demand U.S. funding support of Arrow as part of the security guarantees it seeks before negotiating with the Syrians.

Some observers suggest that if the Israelis want an effective TMD, they should consider acquiring the U.S.-built THAAD system when it is available. The Israelis would object to this for two reasons. First, in Israel's current view, THAAD will not be available soon enough. Israel's perception of Patriot's performance in Desert Storm, coupled with the fact that Israel faces hostile neighbors now armed with missiles, argues for deployment of a more advanced TMD system as soon as possible. Second, many Israeli leaders argue it is important for Israel to build up its own defense industries with advanced technology projects, such as Arrow. Israel also views the four to one U.S. investment in Arrow a good investment in its defense industry. Some critics, however, see no national interest rationale for U.S. funding of the Israeli system. Because of Congress' long-standing support for Israel, these issues again are likely to be considered during this session.

What is the Relationship of TMD to General Purpose Forces?

In many respects, TMD remains in its infancy. A number of questions can be raised regarding the integration of TMD forces with existing military air-defense and theater operational doctrines and capabilities. For example, how much priority will be given to TMD missions in future regional conflicts? How will the various service TMD systems be integrated operationally? How will TMD systems be integrated with air defense systems? How will TMD systems be integrated with ground and air attack forces? How will TMD systems be operated: jointly in a multinational task force or with NATO partners?

The JCS Mission Needs Statement identifies the threat to be dealt with (theater ballistic missiles, cruise missiles, and air-to-surface missiles), but there is little evidence of interservice coordination on these issues to this point. This lack of coordination has been identified as something that must be resolved, and while there is some movement in this direction, for the most part, neither the services nor BMDO have made the issues any priority.

FY1995 Defense Appropriations and Authorization

For FY1995, the Clinton Administration requested $2.98 billion for ballistic missile defense programs (excluding Brilliant Eyes space-based sensors). The request included about $1.73 billion for TMD programs and other TMD activities. The conference report on the FY1995 Defense Authorization Act (P.L. 103-337; signed into law October 5,

1994) provided about $1.69 billion for TMD programs and other TMD activities. The FY1995 Defense Appropriations Act (H.R. 4650, P.L. 103-335, signed into law September 30, 1994) provides about $1.69 billion for TMD programs and other TMD activities. The conferees singled out and earmarked $74 million for PAC-3 risk reduction efforts, $75 million for the Navy upper-tier program, and $3 million for a joint U.S.-Israel Boost Phase Intercept program (as long as the Secretary of Defense certifies to the congressional defense committees that the two countries have entered into a formal contract and that the projects will have specific, direct benefits for the United States).

FY1996 Defense Appropriations and Authorization

The FY1996 defense authorization bill includes language that (1) "reaffirms" Congress' position that the 1972 ABM Treaty does not apply to missile defense systems designed to counter modern theater ballistic missiles (i.e., those U.S. TMD programs currently under development); and (2) FY1996 funds may not be obligated or expended to implement an arms control agreement that would establish a demarcation between TMD systems and ABM systems for the purposes of the ABM Treaty, or restrict the performance, operations, or deployment of U.S. TMD systems. The FY1996 defense appropriations bill, to which President Clinton gave qualified approval, became law without the president's signature on December 1, 1995. The bill earmarks $200.4 million for the Sea-Based Wide Area Defense (Navy Upper-Tier) and $282.5 million on Navy Lower-Tier programs. The Conferees expressed strong support for deploying both Navy Upper- and Lower-Tier systems "as rapidly as possible," building on existing ship platforms and missile launch systems.